SUMMARY
Machine Experiments

Wolfram Fischer

RHIC Retreat Close-Out
Snyder Hall
28 March 2002

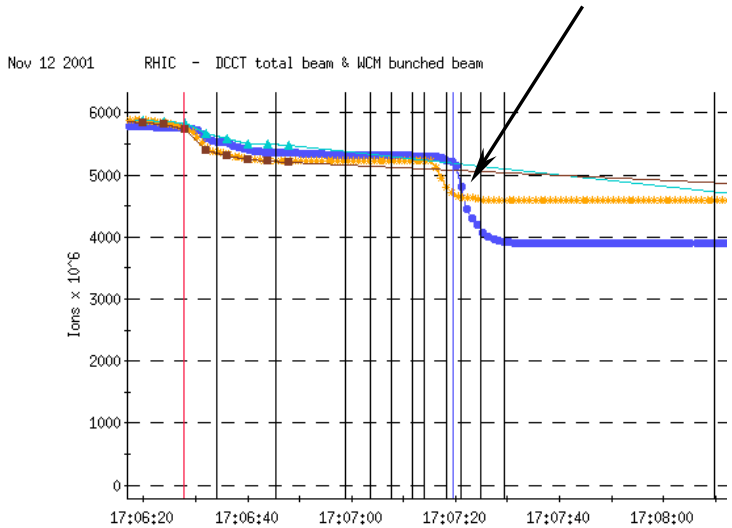
Overview

- Only machine experiments with likely impact on operation in the next run were discussed
- Emphasis on new problems and novel techniques
- Problems considered:
  - Transition crossing
  - Non-linear IR correction
  - Transverse and longitudinal instabilities
  - Beam-beam effects
  - Polarized beam manipulations
  - Pressure rise
  - Organization of machine experiments

C. Montag – Transition Crossing

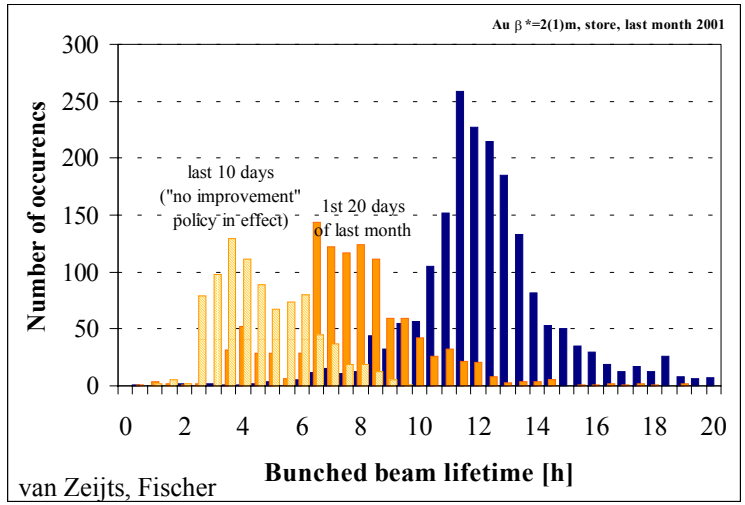
- **Problems**
  - Partial beam loss at transition with high intensity
  - Emittance growth
  - Instabilities
- **Proposed measurements**
  - α_1 (f_s vs. radial loop setting)
  - Longitudinal emittance vs. γ-jump amplitude and speed
- **Possible benefits for operation**
  - Larger intensities at store
  - Smaller emittances at store

Transition losses with 10^9 Au ions per bunch, 6 bunches only

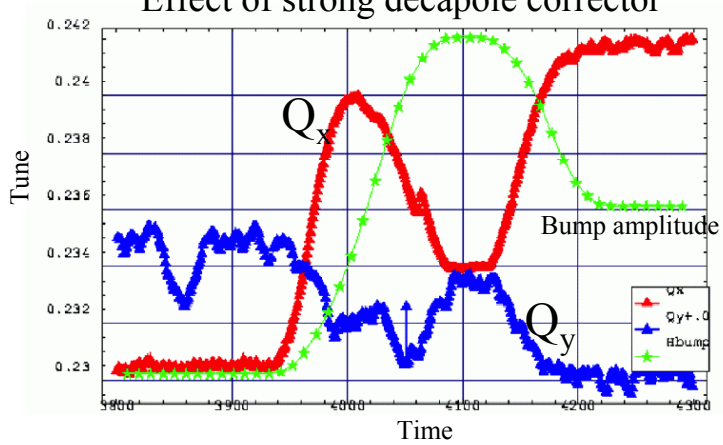


V. Ptitsyn – Non-Linear IR Correction

- **Problems**
  - Beam losses on ramp, particularly at transition
  - Beam lifetime with β*=2m(1m) low, especially for Yellow
- **Proposed measurements**
  - Check effectiveness of local IR correctors with tune-vs.-bump amplitude method
  - 0.2 and 0.25 resonance correction
- **Possible benefits for operation**
  - Reduced losses during ramp
  - Better beam lifetimes in stores
  - Less emittance growth in stores



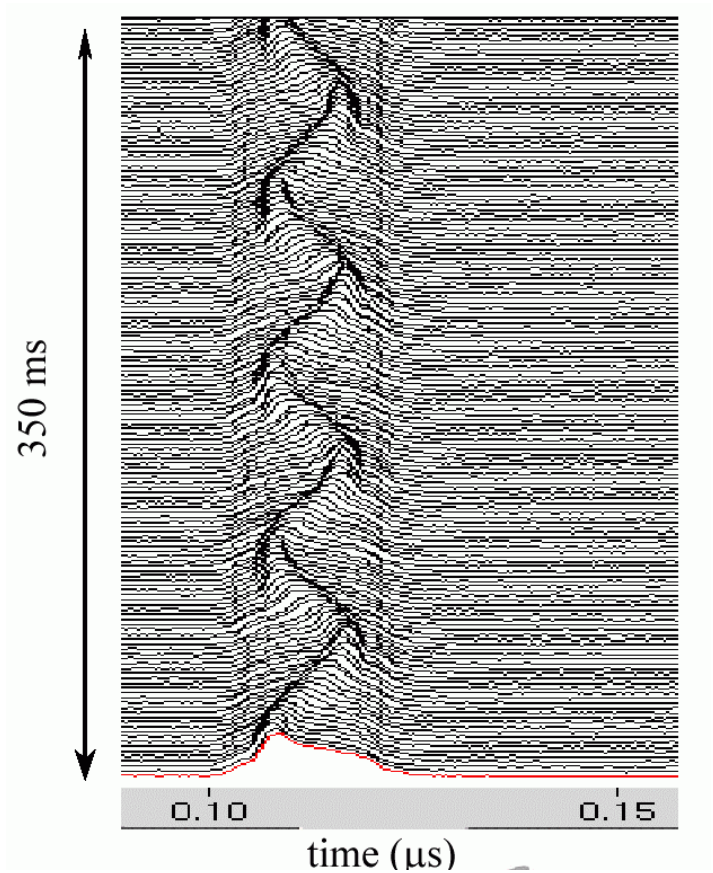
Effect of strong decapole corrector



M. Blaskiewicz – Instabilities

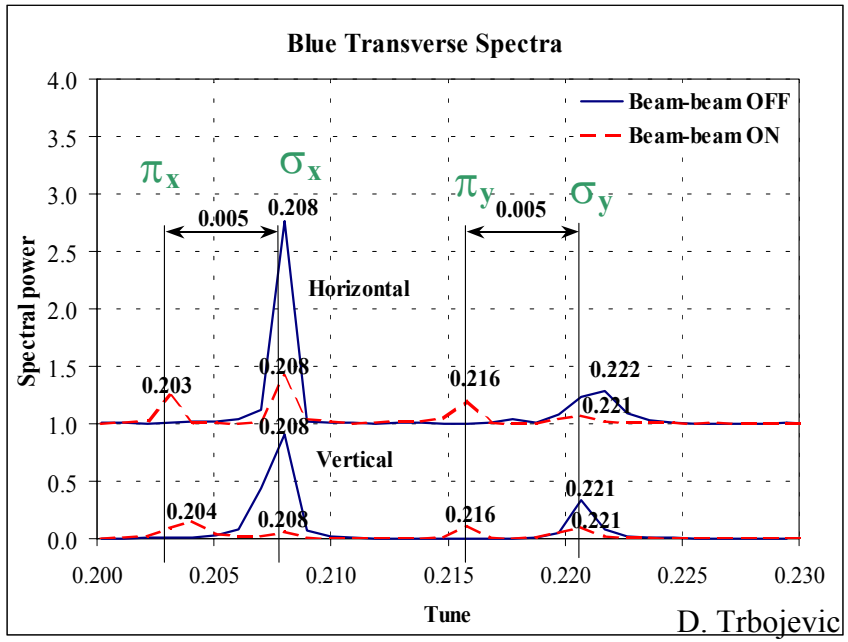
- **Problems**
  - Collective effects observed in long. and transv. planes
  - Lead to particle loss and emittance blow-up
- **Proposed measurements**
  - Improved measurements for long. and transv. wake potentials
  - Better data acquisition at transition
- **Possible benefits for operation**
  - Future operation with higher intensities
  - Reduced emittance growth

Proton bunch after 40min in store



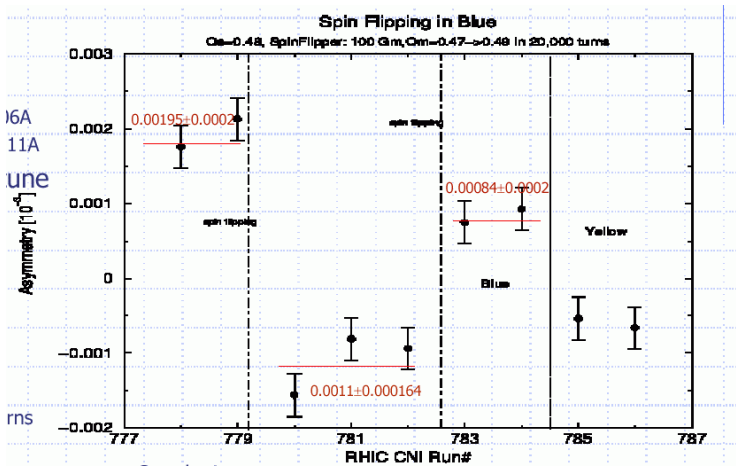
W. Fischer – Beam-Beam Effects

- **Problems**
  - Emittance growth in store
  - Coherent BB modes
- **Proposed measurements**
  - Emittance growth w/o BB, with transverse offset
  - Study coherent mode suppression (tunes, tune spread, intensity)
- **Possible benefits for operation**
  - Running closer to beam-beam limit



M. Bai – Polarized Beam Manipulation

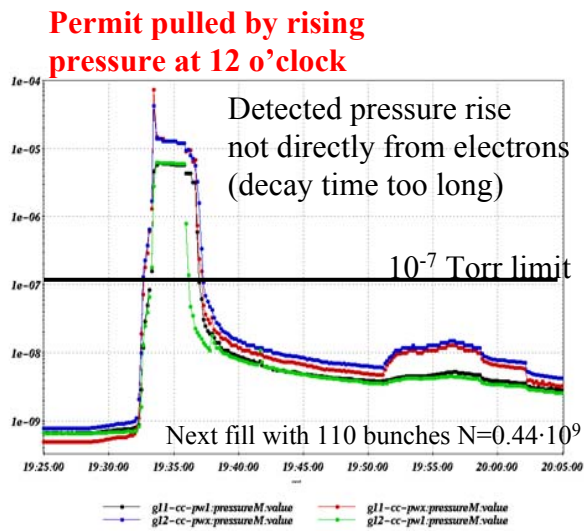
- **Problems**
  - Need to flip spin direction
  - Need to measure spin tune
- **Proposed measurements**
  - Spin flipping efficiency with AC dipole, both rings
  - Calibrate snakes with spin tune measurement
  - Polarization profile



- **Possible benefits for operation**
  - Achieve full spin flip in operation
  - Improved confidence in CNI polarimeter

S.Y. Zhang – Pressure Rise

- **Problems**
  - Pressure rise with intense beams
- **Proposed measurements**
  - Coherent tune shift along train
  - Electron cloud densities from special detectors, in region with solenoids (on/off)
  - Correlation with pressure rise
- **Possible benefits for operation**
  - Operation with higher bunch charge
  - Operation with 112 bunches



F. Pilat – Benefits of Beam Experiments

Beam Experiments →
Machine Developments →
Machine Production (Luminosity)

- Only way to sustain a stronger than linear increase
  (Δt linear, limited, expensive)

- **Proposal for "New Deal"** in 2003
  - Keep 1 BEx session/week (12h) + Friday meeting
  - Regular scheduling for BEx activities
  - Compromise on length of beam experiments rather than frequency